What is claimed is:

1. A process to prepare a detergent comprising:

(a) reacting, in the presence of a solvent (typically an oil medium, or a hydrocarbon solvent such as an alkane (typically hexane), or toluene), a mixture of

(i) an acidic detergent substrate, and

(ii) a basic metal compound, and optionally further in the presence of an alcohol;

(b) optionally reacting the product of (a) with carbon dioxide to form an overbased detergent; and

(c) optionally, removing volatiles (typically solvent, water or alcohol) from the product of (a) or (b),

wherein a hydroxycarboxylic acid, or a reactive equivalent thereof, is added to at least one of any required step selected from the group consisting of (a), (b), (c), and mixtures of steps (a) to (c).

2. A process to prepare a detergent comprising:

(a) reacting in the presence of a solvent (typically an oil medium, or a hydrocarbon solvent such as an alkane (typically hexane), or toluene), a mixture of

(i) an acidic detergent substrate, and

(iii) a basic metal compound, and optionally further in the presence of an alcohol;

(b) reacting the product of (a) with carbon dioxide to form an overbased detergent; and

(c) optionally, removing volatiles (typically solvent, water or alcohol) from the product of (a) or (b),

wherein a hydroxycarboxylic acid, or reactive equivalent thereof is added to at least one of step (a), (b), or mixtures thereof of step (a) or (b).

3. A process to prepare a detergent comprising:

(a) reacting in the presence of a solvent (typically an oil medium, or a hydrocarbon solvent such as an alkane (typically hexane), or toluene), a mixture of

(i) an acidic detergent substrate, and

(ii) a basic metal compound, and optionally further in the presence of an alcohol;

(b) reacting the product of (a) with a hydroxy-carboxylic acid, or reactive equivalent thereof, and carbon dioxide to form an overbased detergent; and

(c) optionally, removing volatiles (typically solvent, water or alcohol) from the product of (a) or (b).

4. A process to prepare a detergent comprising:

(a) reacting in the presence of a solvent (typically an oil medium, or a hydrocarbon solvent such as an alkane (typically hexane), or toluene), and optionally further in the presence of an alcohol, a mixture of

(i) a hydroxy-carboxylic acid,

(ii) an acidic detergent substrate, and

(iii) a basic metal compound;

(b) reacting the product of (a) with carbon dioxide to form an overbased detergent; and

(c) optionally, removing volatiles (typically solvent, water or alcohol) from the product of (b).

5. The process of any one of the preceding claims, wherein step (b) is required, resulting in the process preparing an overbased detergent, and wherein the detergent has a TBN of 200 to 600, or 300 to 550, or 350 to 500 mg KOH/g.

6. The process of anyone of the preceding claims, wherein the basic metal compoundcomprises a metal that is monovalent, divalent or trivalent andis a hydroxide or oxide of the metal.

7. The process of any one of the preceding claims, wherein the basic metal compound comprises a metal that is an alkali metal or alkaline earth metal.

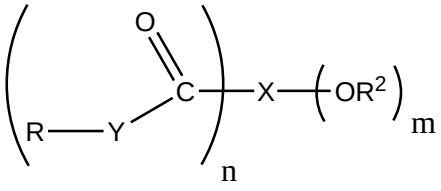
8. The process of claim 7, wherein the metal is lithium, sodium, potassium, magnesium, calcium, barium, or mixtures thereof,

9. The process of any one of the preceding claims, wherein the acidic detergent substrate is a hydrocarbyl-substituted sulphonic acid, a hydrocarbyl-substituted hydroxy-aromatic acid, or mixtures thereof.

10. The process of any one of the preceding claims, wherein the acidic detergent substrate is a hydrocarbyl-substituted organic acid or a hydrocarbyl-substituted phenol.

11. The process of any one of the preceding claims, wherein the hydroxy-carboxylic acid is non-aromatic.

12. The process of any one of the preceding claims, wherein the hydroxy-carboxylic acid is represented by the formula:



wherein

n and m are independently integers of 1 to 5;

X is an aliphatic or alicyclic group, or an aliphatic or alicyclic group containing an oxygen atom in the carbon chain, or a substituted group of the foregoing types, said group containing up to 6 carbon atoms and having n+m available points of attachment;

each Y is independently –O–, >NH, or >NR^1 or two Ys together representing the nitrogen of an imide structure R-N< formed between two carbonyl groups; and

each R and R^1 is independently hydrogen or a hydrocarbyl group,

each R^2 is independently hydrogen, a hydrocarbyl group or an acyl group, further provided that at least one -OR^2 group is located on a carbon atom within X that is α or β to at least one of the -C(O)-Y-R groups, with the proviso that at least one of R and R^2 is hydrogen (typically all R and R^2s are hydrogen).

13. The process of any one of the preceding claims, wherein the hydroxy-carboxylic acid is tartaric acid, malic acid, citric acid, glycolic acid, or mixtures thereof.

14. The process of any one ofclaims 1 to 11, wherein the hydroxy-carboxylic acid is lactic acid, malic acid, or mixtures thereof.

15. The process of any one of the preceding claims, wherein the acidic detergent substrate and the hydroxy-carboxylic acid are present as reactants with a mole ratio of the acidic detergent substrate to the hydroxy-carboxylic acid in the range of 20:1 to 1:2, or 20:1 to 1:1, or 18:1 to 1:1.

16. A product obtained by the process of any one of the preceding claims.

17. A lubricating composition comprising an oil of lubricating viscosity and the product of claim 16.

18. The lubricating composition of claim 17, wherein the product is present in the range of 0.01 wt % to 8 wt %, or 0.1 wt % to 6 wt %, or 0.15 wt % to 5 wt %, or 0.2 wt % to 3 wt % of the lubricating composition.

19. A method of lubricating an internal combustion engine comprising supplying to the internal combustion engine a lubricating composition of claim 17 or 18.

20. The method of claim 19, wherein the internal combustion engine has a steel surface on a cylinder bore, cylinder block, or piston ring.

21. The method of claim 19, wherein the internal combustion engine has a surface of steel, or an aluminium alloy, or an aluminium composite.

22. A method of lubricating a driveline device comprising supplying to the driveline device a lubricating composition of claim 17 or 18.

23. The method of claim 22, wherein the driveline device includes a manual transmission that may or may not contain a synchronizer system, or an axle.

What is claimed is:

1. A process to prepare a detergent comprising:

(a) reacting in the presence of a solvent comprising (i) an oil medium or (ii) a hydrocarbon solvent, a mixture of

(i) an acidic detergent substrate, and

(iii) a basic metal compound, and optionally further in the presence of an alcohol;

(b) reacting the product of (a) with a hydroxy-carboxylic acid, or reactive equivalent thereof, and carbon dioxide to form an overbased detergent; and

(c) optionally, removing volatiles from the product of (a) or (b).

2. The process of claim 1, the process preparing an overbased detergent, wherein the detergent has a TBN of 200 to 600 mg KOH/g.

3. The process of claim 1, wherein the basic metal compound is a hydroxide or oxide of the metal.

4. The process of claim 1, wherein the basic metal compound comprises a metal that is monovalent, divalent, or trivalent.

5. The process of claim 4, wherein the metal is an alkali metal or alkaline earth metal.

6. The process of claim 4, wherein the metal is lithium, sodium, potassium, magnesium, calcium, barium, or mixtures thereof,

7. The process of claim 5, wherein the metal is calcium or magnesium.

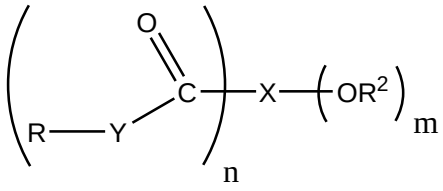
8. The process of claim 1, wherein the acidic detergent substrate is a hydrocarbyl-substituted sulphonic acid, a hydrocarbyl-substituted hydroxy-aromatic acid, or mixtures thereof.

9. The process of claim 8, wherein the acidic detergent substrate is a hydrocarbyl-substituted sulphonic acid or mixtures thereof.

10. The process of claim 8, wherein the acidic detergent substrate is a hydrocarbyl-substituted organic acid or a hydrocarbyl-substituted phenol.

11. The process of claim 1, wherein the hydroxy-carboxylic acid is non-aromatic.

12. The process of claim 11, wherein the hydroxy-carboxylic acid is represented by the formula:



wherein

n and m are independently integers of 1 to 5;

X is an aliphatic or alicyclic group, or an aliphatic or alicyclic group containing an oxygen atom in the carbon chain, or a substituted group of the foregoing types, said group containing up to 6 carbon atoms and having n+m available points of attachment;

each Y is independently –O–, >NH, or >NR^1 or two Ys together representing the nitrogen of an imide structure R-N< formed between two carbonyl groups; and

each R and R^1 is independently hydrogen or a hydrocarbyl group,

each R^2 is independently hydrogen, a hydrocarbyl group or an acyl group, further provided that at least one -OR^2 group is located on a carbon atom within X that is α or β to at least one of the -C(O)-Y-R groups, with the proviso that at least one of R and R^2 is hydrogen.

13. The process of claim 12, wherein the hydroxy-carboxylic acid is tartaric acid, malic acid, citric acid, glycolic acid, or mixtures thereof.

14. The process of claim 13, wherein the hydroxy-carboxylic acid is tartaric acid, citric acid, or mixtures thereof.

15. The process of claim 12, wherein the hydroxy-carboxylic acid is lactic acid, malic acid, or mixtures thereof.

16. The process of claim 1, wherein the acidic detergent substrate and the hydroxy-carboxylic acid are present as reactants with a mole ratio of the acidic detergent substrate to the hydroxy-carboxylic acid in the range of 20:1 to 1:2.

17. A product obtained/obtainable by the process of claim 1.

18. A lubricating composition comprising an oil of lubricating viscosity and the product of claim 17.

19. The lubricating composition of claim 18, wherein the product is present in the range of 0.01 wt % to 8 wt % of the lubricating composition.

20. A method of lubricating an internal combustion engine comprising supplying to the internal combustion engine a lubricating composition of claim 18.

21. The method of claim 20, wherein the internal combustion engine has a steel surface on a cylinder bore, cylinder block, or piston ring.

22. The method of claim 20, wherein the internal combustion engine has a surface of steel, or an aluminium alloy, or an aluminium composite.

23. A method of lubricating a driveline device comprising supplying to the driveline device a lubricating composition of claim 18.

24. The method of claim 23, wherein the driveline device includes a manual transmission that may or may not contain a synchronizer system, or an axle.